

CLAIMS

What is claimed is:

1. A method for consolidating nanophase metal powder, comprising the steps of:  
  
consolidating said powder by applying pressure to said powder at a first temperature;  
  
encompassing said powder with a flowable pressure transmitting medium that is heated to a second temperature that is higher than said first temperature; and  
  
compressing said heated medium and thereby further consolidating said powder.
2. The method according to claim 1, wherein said second temperature ranges between about 700 °F and about 1000 °F.
3. The method according to claim 2, wherein said second temperature ranges between about 775 °F and about 875 °F.
4. The method according to claim 1, wherein said first temperature ranges between about 700 °F and about 1000 °F.
5. The method according to claim 4, wherein said first temperature is about 700 °F.
6. The method according to claim 1, wherein said compressing step comprises mechanically compacting said heated medium to thereby further consolidate said powder.

7. The method according to claim 6, wherein said mechanically compacting is performed using a hydraulic press to thereby further consolidate said powder.
8. The method according to claim 1, wherein said powder is enclosed in a container during said encompassing step, said container also being encompassed with said medium.
9. The method according to claim 8, wherein said container is formed of a material that is sufficiently thin to have a negligible effect on consolidating said powder when said medium is compressed.
10. The method according to claim 1, further comprising:
  - prior to said consolidating step, cryomilling and degassing said powder.
11. The method according to claim 1, wherein said powder is a nanophase metal selected from the group consisting of aluminum, iron, aluminum alloys, and iron alloys.
12. The method according to claim 10, wherein said powder is nanophase aluminum.

13. A method for consolidating nanophase metal powder, comprising the steps of:
  - encompassing said nanophase metal powder with a flowable pressure transmitting medium that is heated to a first temperature;
  - compressing said heated medium at said first temperature and thereby consolidating said powder;
  - heating said medium to a second temperature that is higher than said first temperature; and
  - compressing said heated medium at said second temperature and thereby further consolidating said powder.
14. The method according to claim 13, wherein said second temperature ranges between about 700 °F and about 1000 °F.
15. The method according to claim 14, wherein said second temperature ranges between about 775 °F and about 875 °F.
16. The method according to claim 13, wherein said first temperature ranges between about 700 °F and about 1000 °F.
17. The method according to claim 16, wherein said first temperature is about 700 °F.
18. The method according to claim 13, wherein said each compressing step comprises mechanically compacting said heated medium to consolidate said powder.

19. The method according to claim 18, wherein said mechanically compacting is performed using a hydraulic press.
20. The method according to claim 13, wherein said powder is enclosed in a container during said encompassing step, said container also being encompassed with said medium.
21. The method according to claim 20, wherein said container is formed of a material that is sufficiently thin to have a negligible effect on consolidating said powder when said medium is compressed.
22. The method according to claim 13, further comprising:
  - prior to said consolidating step, cryomilling and degassing said powder.
23. The method according to claim 13, wherein said powder is a nanophase metal selected from the group consisting of aluminum, iron, aluminum alloys, and iron alloys.
24. The method according to claim 23, wherein said powder is nanophase aluminum.